Kyuden Group Carbon Neutral Vision 2050 Updated May 2025

— Starting from Kyushu, the Kyuden Group will lead the way to Japan's decarbonization —



Enlighten Our Future

The Kyuden Group aims to achieve carbon neutrality by the year 2050 — Starting from Kyushu, the Kyuden Group will lead the way to Japan's decarbonization —

- We aim to become the corporate group that leads the decarbonization of Japan from Kyushu as the front-runner in carbon reduction / decarbonization efforts, seizing our response to global warming as an opportunity for corporate growth.
- We set two pillars for efforts on both the supply and demand sides of energy, continuing to challenge "carbon reduction / decarbonization in power sources" and "promotion of electrification".
- Under the leadership of the "Sustainability Promotion Committee", chaired by the president, we will promote ESG-related measures and initiatives for achieving carbon neutrality.

Carbon reduction / decarbonization in power sources

Stable supply of electricity with net zero CO² emissions by further increasing our ratio of zero-emission power sources

Promotion of electrification

Contribution to reducing customers' CO² emissions through initiatives to encourage maximum electrification

Sustainability Promotion Committee

Promoting ESG-related measures and initiatives to achieve carbon neutrality

Kyuden Group's Goals for 2050

The Kyuden Group aims to achieve carbon neutrality by the year 2050 and "Carbon Minus"*¹ as early as possible before 2050, by reducing GHG emissions in its supply chain and contributing to the reduction of emissions across society

- We will reduce greenhouse gas (GHG) emissions throughout our supply chain to net zero through our business activities.
- We will contribute to the reduction of GHG emissions in society by promoting the maximum possible electrification and ensuring the stable delivery of environmentally friendly energy.
- Through these efforts, the Kyuden Group will achieve "Carbon Minus"*¹ as early as possible, before 2050.
- *1 By promoting electrification and developing renewable energy, we aim to create a reduction effect that exceeds the GHG emissions of the Kyuden Group. This state called, "Carbon Minus", we seek to offset supply chain emissions by reducing the overall GHG emissions of society through our business activities.



(Source) Created by Kyuden Group based on the "Calculation of Supply Chain Emissions" from the Ministry of the Environment

*2 Following the GHG Protocol, which is the international standard for calculating and reporting GHG emissions, emissions are calculated for three different scopes (categories) of emission types.

(Note) The achievement of carbon neutrality by 2050 and the environmental targets for 2035 outlined in this roadmap are contingent upon the establishment of national policy support and technological advancements. This roadmap may be subject to revision based on changing circumstances.



		to 2035	to 2050
Reduce GHG emissions in the supply chain	Thermal / Nuclear	Develop high-efficiency LNG power plants, Co-firing of hydrogen/ammonia, Partial implementation of CCS	Increase the co-firing ratio of hydrogen/ammonia, transition to dedicated combustion, Practical implementation of CCS/CCUS
		Enhance utilization rates by extending periodic inspection intervals, replace steam turbines, Explore the development and installation of next-generation innovative reactors	
	Renewables /	Develop solar power, geothermal power, battery storage	Develop next-generation power storage and solar power, and deep geothermal power
Contribute to reducing society-wide GHG emissions	Power storage	Develop fixed offshore wind power, pumped-storage power	Develop floating offshore wind power, EEZ offshore wind power, tidal power*
	Electrification	Conversion of residential and commercial heat sources, Industrial heat pumps, EV buses	Electrification of ports, construction machinery, and smart agriculture
	CO ₂ absorption & sequestration	Forest cultivation, Advanced forest management, Promotion of wood utilization	DACCS

* See page 4 for an overview of efforts toward future social implementation

Topics: Efforts Toward at Future Social Implementation

Renewable energy/Power storage



Tidal power generation

- Utilization of untapped marine energy
- Early practical application on remote islands, ,among others

Next-generation power storage

- Demonstration testing and practical application of all-solidstate batteries
- Establishment of evaluation methods and monitoring control technology for next-generation batteries



Deep geothermal power generation

 Assessing the feasibility of geothermal power technology^{*1} using deep artificial reservoirs (3 km or deeper), with demonstration projects planned both domestically and internationally

Next-generation solar cells

 Research and performance assessment for demonstrations and practical implementation of high-efficiency quantum dot solar power technology^{*2}



Consider its use when replacing existing solar panels

*1 By creating artificial reservoirs at depths of 3 km or more, geothermal power generation becomes feasible regardless of location (in Kyushu, high-temperature layers are relatively shallow). Under high-temperature and high-pressure (supercritical) conditions, this approach enables higher efficiency and greater output compared to conventional geothermal power generation.

*2 High-efficiency solar power generation using quantum dots with a broader light absorption spectrum than conventional solar panels. When adopted during solar panel replacement, it enables approximately twice the power generation from the same surface area.

Electrification



Smart agriculture

- Conversion to temperature-adjustable heat pumps, optimal production environment management through sensors and AI, and the creation of high-added-value agricultural products
- Labor-saving through the use of self-driving tractors and harvesting robots

Electrification of ports

- Power supply to ships at berth and electrification of port facilities, such as cargo handling machinery
- Electrification of ship propulsion systems

CO₂ absorption and sequestration



Forest absorption

- Effective management of owned forests
- Enhancement and support of J-Credit projects utilizing forest resources
- Expansion of forestry business

DACCS

 Demonstration testing and practical implementation of technology for direct capture of CO₂ from the atmosphere (regardless of location)

• Site/technical assessment for the demonstration and practical implementation of technology for CO₂ underground storage





Kyuden Group Initiatives for Carbon Neutrality by 2050



Transitioning to Renewables as the Main Power Source



- To achieve carbon neutrality, the Kyuden Group will accelerate development and investment in the five main renewable energy sources^{*1} as well as storage batteries, pumped storage, and other solutions that have power adjustment functions.
- We will expand the sales volume of renewable energy not only through our own domestic development but also through procurement from other companies and promotion of renewable energy development internationally.
 We will also work to create more advanced aggregation and trading*², develop solutions, and deploy next-
- We will also work to create more advanced aggregation and trading*2, develop solutions, and deploy nextgeneration energies such as green hydrogen to maximize value and achieve renewable energy independence.

*1 Solar, wind, geothermal, hydroelectric, and biomass

*2 Aggregation (bundling electricity) and trading (electricity transactions based on optimal demand-supply management plans)



*Includes FIT electricity without non-fossil certificates (which does not have value as renewable energy or as a zero-emission power source, but is treated as electricity at the national average CO₂ emission level and includes thermal power)

Maximum Utilization of Nuclear Power

Nuclear power is a stable source of energy that features high energy density, emits no CO₂ during electricity generation, and is unaffected by weather or climate*.

Nuclear power

- Prioritizing safety and in dialogue with the local community, we will continue to maximize the use of existing reactors by enhancing their utilization rates.
- In the future, we plan to explore the use of next-generation innovative reactors that offer high levels of safety, including next-generation light water reactors, SMRs, and HTGRs, as well as leveraging nuclear energy to produce hydrogen.

*High-level radioactive waste generated from the reprocessing of spent fuel will be ultimately disposed in stable geological formations deep underground by the Nuclear Waste Management Organization of Japan (NUMO), an authorized corporation by the Ministry of Economy, Trade and Industry



Net Zero CO₂ Emissions from Thermal Power



- Thermal power remains crucial for balancing the expansion of renewable energy and ensuring stable supply by adjusting for fluctuations in renewable energy output.
- We will continue working toward even higher efficiency as well as on hydrogen and ammonia co-firing and eventually dedicated firing, as these fuels produce no CO₂ during combustion.
- We will also strive toward the practical application of CCS/CCUS for CO₂ capture and storage, explore manufacturing CO₂-free hydrogen and ammonia using surplus renewable energy, and build supply chains.
- We will aim to phase out inefficient coal power plants by 2030, taking into account supply capacity, energy supply costs, and local circumstances.



Advanced Transmission and Distribution Network



- To fully utilize renewable energy potential in Kyushu, we will focus on optimizing transmission capacity and enhancing inter-regional transmission lines and core power grids, guided by the national government's master plan. This will support the cross-regional operation of the transmission and distribution network.
- We will work on advanced technologies for demand-supply management and grid stabilization using digital technology to balance the large-scale adoption of renewable energy while maintaining power quality.



Maximum Electrification





* The electrification rate of Kyushu is estimated by the company based on national statistical information.

Maximum Electrification



- For the industrial sector, we will conduct research on technologies for heat source conversion equipment, such as heat pumps, and tackle the electrification of heating needs at a wide range of temperatures (hot water, steam, heating) in production processes.
- We will promote energy-saving proposals aimed at improving energy utilization efficiency by conducting on-site surveys and studies with our customers.
- Additionally, we will explore business opportunities in hydrogen supply for high-temperature heating needs.
- In the transport sector, to accelerate the widespread use of EVs, we will offer services such as EV sharing, development of charging infrastructure and energy management utilizing EVs.



Creating a Zero-Carbon Society with Local Communities

